



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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## (60) Parent Application or Grant

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## (54) Title: AEROSOL FOR DISPENSING A LIQUID

(54) Titre: GENERATEUR D'AEROSOLS SERVANT A L'ADMINISTRATION D'UN LIQUIDE

## (57) Abstract

Aerosol for dispensing a liquid, in particular in the form of a foam, at least comprising a liquid container (2) and a dispensing assembly (1) which is coupled thereto at least in liquid-tight manner, the dispensing assembly (1) comprising a liquid pump (4) with a liquid inlet (15) and a liquid outlet (17), and an actuating head (10), the actuating head (10) comprising an outlet passage (12) and a dispensing opening (11) for dispensing the liquid, while the actuating head (10) furthermore comprises a closed, circumferential protective cap (14), the aerosol furthermore comprising a circumferential recess (27), into which the protective cap (14) can move, which recess (27) comprises a closed inner wall (29), an outer wall (30) and a base (28), and one or more outlet openings (31) are present in the vicinity of the base (28) of the recess (27), in which aerosol the shape of the recess (27) is such that the inner wall (29), on the side which is remote from the base (28), is at a radial distance p from the protective cap (14), which distance p is greater than the usual clearance distance of the protective cap (14) with respect to the inner wall (29).

## (57) Abrégé

L'invention porte sur un générateur d'aérosols servant à l'administration d'un liquide, en particulier sous forme de mousse, et comportant au moins un récipient recevant un liquide (2) et un dispositif distributeur (1) lui étant relié hermétiquement. Le dispositif distributeur (1) comprend une pompe (4) avec une entrée (15) de liquide et une sortie (17) de liquide, et une tête d'actionnement (10) comprenant un passage de sortie (12) et un orifice de distribution (11) du liquide, ainsi qu'un capuchon protecteur (14) circulaire fermé. Le générateur d'aérosols comprend en outre un évidement circulaire (27) où peut se déplacer le capuchon protecteur. L'évidement circulaire (27) comprend une paroi intérieure fermée (29), une paroi extérieure (30), une base (28), et une ou plusieurs ouvertures proches de la base (28). La forme de l'évidement (27) est telle que le côté de la paroi intérieure (29) opposé à la base (28) se trouve à une distance radiale p du capuchon protecteur (14) supérieure au jeu normal entre le capuchon protecteur (14) et la paroi intérieure (29).

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Short title: Aerosol for dispensing a liquid

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The invention relates to an aerosol for dispensing a liquid, in particular in the form of a foam, at least comprising a liquid container and a dispensing assembly which is coupled thereto at least in liquid-tight manner, the dispensing assembly comprising a liquid pump with a liquid inlet and a liquid outlet, and an actuating head, the actuating head comprising an outlet passage and a dispensing opening for dispensing the liquid, while the actuating head furthermore comprises a closed, circumferential protective cap, the aerosol comprising a circumferential recess, into which the protective cap can move, which recess comprises a closed inner wall, an outer wall and a base, and one or more outlet openings are present in the vicinity of the base of the recess.

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An aerosol of this nature is known from JP-A-9-77115.

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Aerosols of the type referred to in the introduction are used, inter alia, to dispense liquids as such, such as toothpaste, gel, etc. There are also aerosols which are intended to dispense atomized air/liquid mixtures, such as deodorant, hair sprays, paint, etc. However, the latter type of aerosol may also comprise foam-forming means, so that the aerosol is suitable for dispensing foam products, such as shaving foam, soap, shower foam, etc.

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In the context of the present invention, the term liquid is understood as meaning both low-viscosity liquids and viscous liquids and pasty materials.

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In the aerosol described in JP-A-9-77115 the inner wall of the annular recess forms a substantially vertical guide wall for the protective cap. In other words, during use, the protective cap moves up and down along this inner wall in very close proximity thereto.

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In the case of personal hygiene products, the aerosol is frequently used in a damp environment, such as in a bathroom in the bath or under the shower. In the case of paint and other products, it is also necessary to prevent

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5 liquid products, such as the products to be dispensed or water, entering the dispensing assembly.

10 The aerosol described in JP-A-9-77115 is reasonably successful at preventing water which runs downwards along  
5 the protective cap, for example, finding it easy to enter the dispensing assembly at the liquid pump.

15 When the aerosol is used, by depressing the actuating head, a liquid will be dispensed by actuation of the liquid pump and emptying of the liquid pump chamber. If  
10 the actuating head is then released, the pump will move back towards its starting position, during which movement the pump chamber is filled with liquid. While the pump chamber is being filled, liquid is withdrawn from the liquid container. This volume of liquid which has been removed has  
15 to be compensated for by admitting air to the liquid container from the protective cap.

20 When the actuating head is depressed, the space which is enclosed by the actuating head and the inner wall of the annular recess will be reduced in size. When the  
25 actuating head moves back into its starting position, this volume will increase in size. This also has to be compensated for by admitting air.

30 In both cases, air will be drawn into the dispensing assembly between the inner wall of the annular recess and  
35 the protective cap. It is thus nevertheless possible for leakage water, possibly contaminated with dispensed liquid, conceivably in the form of a foam, to enter the dispensing assembly.

40 Products which are to be dispensed using aerosols  
30 are frequently sticky once they have dried and therefore, if they reach the dispensing assembly, can considerably impede and even completely disrupt operation thereof.

45 It is also the case that the liquids to be dispensed are frequently liquids which give rise to the formation of  
35 foam, with all the associated disadvantages.

50 It will be clear that it is also highly undesirable if there is any possibility of foreign substances from the environment entering the liquid container together with the leakage water.

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5                 The object of the present invention is to provide a  
solution to the above problems, and to this end the  
invention is characterized, in that the shape of the recess  
is such that the inner wall, on the side which is remote  
10                 5 from the base, is at a radial distance p from the protective  
cap, which distance p is greater than the usual clearance  
distance of the protective cap with respect to the inner  
wall.

15                 Due to the particular shape of the inner wall of the  
recess in the aerosol according to the invention, any liquid  
10                 10 which is sucked up during the restoring movement of the  
dispensing head can be temporarily accommodated in the space  
between the inner wall which is of particular design and the  
protective cap. Once the restoring movement has been  
20                 15 completed, at the latest, the liquid can easily flow out of  
this space to the outlet openings or can be pressed out  
25                 25 during a subsequent actuation.

               The particular design of the aerosol according to  
the invention makes it virtually impossible for water to  
20                 20 enter the dispensing assembly from outside the aerosol. All  
the leakage water will be discharged through the outlet  
opening(s) in the base of the recess to the environment.

               The available clearance distance is understood as  
meaning a distance p as disclosed, for example, in JP-A-9-  
35                 35 77115. This distance p is such that there is suitable  
guidance provided between the inner wall of the recess and  
the protective cap, and will in practice be relatively  
40                 40 small. This distance p will be selected in such a manner  
that the protective cap can be successfully guided by the  
30                 30 inner wall without unnecessary friction.

               Advantageously, the distance p according to the  
invention is at least 2 mm, or the distance p is greater  
45                 45 than or equal to 0.1 times the internal diameter d of the  
protective cap. The distance p is preferably greater than or  
35                 35 equal to 0.3 times the internal diameter of the protective  
cap, and more preferably greater than or equal to 0.5 times  
50                 50 the internal diameter of the protective cap. It will be  
clear that the distance p is most preferably as great as  
possible.

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According to the invention, various shapes of the inner wall are possible. For example, this inner wall may comprise a substantially straight cylinder with a diameter which is significantly smaller than the internal diameter  $d$  of the protective cap, the distance  $p$  between the straight cylinder and the inside of the protective cap being greater than the available clearance distance as defined above. In this embodiment, it will be impossible for any liquid to be sucked up, since the distance between the inner wall and the protective cap is too great.

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Preferably, however, the inner wall of the recess, at least in the vicinity of the side which is remote from the base of the recess, is of conical shape which narrows towards the base. Particularly in the latter design, which 20  
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will be explained in more detail below in the figure, the conical shape of the inner wall will prevent any formation of bubbles in the space between the inner wall and the protective cap. Bubbles which form in that area will be easy to break up due to the increase in their surface area which occurs.

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The basis of the present invention is that there is no liquid sucked up between the inner wall of the recess and the protective cap, or that a space is formed between the inner wall and the protective cap, in which any liquid which 35  
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is sucked up can be temporarily stored and then discharged. These aspects will be explained in more detail below in the description of the figures.

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Preferably, the dispensing assembly furthermore comprises an air pump with an air inlet and an air outlet. 30  
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The present invention offers particular advantages if there is an air pump present. When the air pump chamber has been emptied, for example after an atomized liquid or a foam has been dispensed, this chamber has to be refilled with air from the environment. If, at that moment, water is present in the dispensing assembly, there is a high risk of it being sucked into the air pump chamber via the air inlet. Not only does this impede the operation of the air pump, it also disrupts the mixing ratio between the air and liquid. The mixing ratio is of essential import for many air/liquid

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mixtures which are to be dispensed. In practice, this applies in particular to so-called foam formers.

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A foam former is an aerosol which comprises foam-forming means. Foam-forming means are, for example, one or 5 more small meshes in the outlet passage. A foam is formed by mixing air and liquid and then passing it through the meshes. If additional leakage water, for example, is mixed with the air and the liquid, in the most serious case there 15 will be no foam formed at all.

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10 The outlet opening(s) in the base of the recess may, if necessary, be in communication with outlet means 20 which guide the water to outside the aerosol.

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In a particular embodiment of the aerosol according to the invention, the air pump and the liquid pump 15 are designed as an assembly of two concentric piston pumps. Particularly with concentric piston pumps of this nature, it 25 is imperative that any leakage of water into the dispensing assembly in the vicinity of the pumps be avoided. All this will be explained in more detail below in the description of 20 the figures.

30

Advantageously, the internal diameter of the protective cap of the actuating head is greater than the external diameter of the piston pumps which are present. In this way, the pumps are very well protected against the 35 penetration of water.

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Preferably, the recess according to the invention forms a part of the dispensing assembly.

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The invention furthermore provides a dispensing assembly which is intended for an aerosol according to the 30 invention.

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The invention will be explained in more detail below with reference to the appended drawing, in which:

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Fig. 1 shows an aerosol according to the invention in the neutral position;

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35 Fig. 2 shows the aerosol shown in Fig. 1 during or just after dispensing of foam;

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Fig. 3 shows another design of an aerosol according to the invention for dispensing foam; and

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5 Fig. 4 shows an enlarged view of the annular recess  
shown in Fig. 3.

10 Fig. 1 shows an aerosol 1 according to the invention  
for dispensing foam, comprising a liquid container 2 and a  
15 dispensing assembly 3. The dispensing assembly 3 is screwed  
onto the liquid container 2. The dispensing assembly 3  
comprises a liquid pump 4 with a liquid pump chamber 5 and a  
liquid pump piston 6. Furthermore, there is an air pump 7  
with an air pump chamber 8 and an air pump piston 9. Both  
10 pistons 6 and 9 are coupled to an actuating head 10.

20 The actuating head 10 comprises a dispensing  
opening 11 and an outlet passage 12, two small meshes 13  
being present in the outlet passage 12 in order to form a  
foam. The head 10 furthermore comprises a circumferential  
25 protective cap 14.

30 A riser tube which extends to close to the bottom  
of the liquid container 2 and serves as an inlet for the  
liquid pump 4 is denoted by 15. Furthermore, the inlet to  
the liquid pump 4 contains a non-return valve in the form of  
35 a ball 16. The outlet from the liquid pump 4 is situated at  
the location indicated by 17 and can be closed off by means  
of a rod-like non-return valve component 18.

40 The outlet from the air pump 7 is situated at the  
location indicated by 19. A flexible sealing component is  
45 denoted by 20, comprising two annular, resilient sealing  
lips 21 and 22 which are used to close off and open the  
inlet 23 and the outlet 19 of the air pump 7.

50 The dispensing assembly 3 is provided with  
restoring means which comprise a spring 24.

55 30 When the foam former is in use, it is possible to  
press the actuating head 10, with the result that the  
pistons 9 and 6 of the air pump 7 and the liquid pump 4,  
respectively, are moved downwards, with the result that the  
volumes of the corresponding piston chambers 8 and 5,  
35 respectively, are reduced and air and liquid are dispensed  
to a so-called mixing chamber 25, where air and liquid are  
mixed, which mixture is then passed through the two small  
meshes 13, into the outlet passage 12, and leaves the  
dispensing opening 11 in the form of a foam.

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5            After foam has been dispensed, the actuating head  
10 is released and will be returned to its starting position  
by the spring 24. During this return movement, the non-  
return valve 16 will open and the liquid pump chamber 5 will  
10        5 fill with liquid from the liquid container 2, while the air  
pump chamber fills with air.

15           A vent opening for the liquid container 2 is  
denoted by 32 and is used to supply air to the interior of  
the liquid container 2 in order to compensate for the amount  
10        10 of liquid which has been removed from the liquid container.  
Leakage water could also enter the liquid container 2 via  
this opening. Naturally, this is undesirable.

20           The aerosol shown in Fig. 1 furthermore comprises a  
circumferential recess 27 with a base 28, an inner wall 29  
15        15 and an outer wall 30. In the base 28 there are a plurality  
of outlet openings 31 which are in communication with the  
environment. The inner wall 29 extends as far as an annular  
25        25 gap 26. The gap 26 is situated between the inner wall 29 and  
the wall 41 of the outlet passage 12. Advantageously, the  
inner wall 29 according to the invention extends, as far as  
30        30 possible, to the vicinity of the wall 41.

35           During use, the protective cap 14 moves up and down  
in the recess 27. It is clear that the air inlet opening 23  
of the air pump and the vent opening 32 in this case are  
35        35 situated in a space which is in communication with the  
environment only via the gap 26 between the protective cap  
14 and the inner wall 29 and the gap 35 and 36. In other  
words, the inner wall 29 substantially adjoins the actuating  
40        40 head 10 in the vicinity of the outlet passage 12.

45           30        The distance p between the inner wall 29 and the  
protective cap 14 in the vicinity of that side of the inner  
wall 29 which is remote from the base and the internal  
diameter d of the protective cap 14 are also indicated in  
the figures.

50           35        Fig. 2 shows the aerosol from Fig. 1 in the  
depressed position, i.e. during or immediately after  
dispensing of foam. Corresponding components are denoted by  
the same reference numerals.

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If, in the aerosol according to the invention as shown in Figs. 2 and 3, water should run along the protective cap 14, this water always passes only into the recess 27 and can flow out to the environment via the dispensing openings 31 in the base 28 of this recess. It is virtually impossible for water to enter the protective cap via 35 and then to reach the area of the pumps via the gap 26.

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If, during use, the aerosol is depressed as shown in Fig. 2, the space enclosed by the protective cap 14 and the inner wall 29 is reduced in size and a quantity of air is pressed out to the environment via gaps 35 and 36 and the outlet openings 31. It will be clear that a portion of this air is required in order to compensate for the increase in volume of the space above the air piston 9. However, when the actuating component 10 is released and it returns to the at-rest position, air will be sucked in via the gap 35. If, at that moment, there is liquid in the recess 27, this recess will collect in the space between the protective cap 14 and the inner wall 29, at the location indicated by 37. Due to the locally conical design of the inner wall 29, as indicated at 38, any such liquid which is sucked up will never be able to reach the dispensing assembly via 26. The water will be pressed out via 35 during the subsequent actuating stroke. Preferably, however, the gap 35 is sufficiently large for any liquid which has been sucked up to be able to flow out of the space 37 to the outlet openings 31 in the at-rest position.

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Fig. 3 shows a preferred embodiment of the aerosol 1 according to the invention, in which all the components are identical to those shown in the previous figures, but the inner wall 29 is of conical design over virtually its entire length. This again offers the considerably advantage that if the recess 27 contains liquid, for example water, which is sucked up into the space defined by the conical inner wall 29 and the protective cap 14, this liquid cannot reach the dispensing assembly via 26.

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If, in addition to liquid, air is also sucked through the liquid situated in the recess 27, for example

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5 via the outlet openings 31, the surface area of any bubbles  
which form, due to the conical shape of the inner wall 29,  
is increased to such an extent that these bubbles will  
easily break-up. This can be seen clearly in Fig. 4, which  
10 5 shows an enlarged view of the recess 27 shown in Fig. 3. In  
this figure, the formation of a bubble and the way in which  
it breaks up is indicated by dashed lines 40.

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**Claims**

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## CLAIMS

- 10 1. Aerosol for dispensing a liquid, in particular in  
the form of a foam, at least comprising a liquid container  
5 (2) and a dispensing assembly (1) which is coupled thereto  
at least in liquid-tight manner, the dispensing assembly (1)  
comprising a liquid pump (4) with a liquid inlet (15) and a  
liquid outlet (17), and an actuating head (10), the  
actuating head (10) comprising an outlet passage (12) and a  
10 dispensing opening (11) for dispensing the liquid, while the  
actuating head (10) furthermore comprises a closed,  
circumferential protective cap (14), the aerosol furthermore  
comprising a circumferential recess (27), into which the  
15 protective cap (14) can move, which recess (27) comprises a  
closed inner wall (29), an outer wall (30) and a base (28),  
and one or more outlet openings (31) are present in the  
20 vicinity of the base (28) of the recess (27), characterized  
in that the shape of the recess (27) is such that the inner  
wall (29), on the side which is remote from the base (28),  
25 is at a radial distance p from the protective cap (14),  
which distance p is greater than the usual clearance  
distance of the protective cap (14) with respect to the  
inner wall (29).
- 30 2. Aerosol according to claim 1, characterized in that  
the distance p is at least 2 mm.
- 35 3. Aerosol according to claim 1, characterized in that  
the distance p is greater than or equal to 0.1 times the  
internal diameter d of the protective cap (14).
- 40 4. Aerosol according to one or more of claims 1-3,  
30 characterized in that the inner wall (29) of the recess  
(27), at least in the vicinity of the side which is remote  
from the base (28) of the recess (27), is of a conical shape  
45 which narrows towards the base (28).
- 50 5. Aerosol according to one or more of the preceding  
35 claims, characterized in that the dispensing assembly (3)  
furthermore comprises an air pump (7) with an air inlet (23)  
and an air outlet (19).

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6. Aerosol according to claim 5, characterized in that the air pump (7) and the liquid pump (4) are designed as an assembly of two concentric piston pumps.

10 7. Aerosol according to one or more of the preceding  
15 5 claims, characterized in that the internal diameter of the protective cap (14) of the actuating head (10) is greater than the external diameter of the piston pumps which are present.

15 8. Aerosol according to one or more of claims 1-7,  
20 10 characterized in that the recess (27) forms a part of the dispensing assembly (1).

9. Dispensing assembly intended for an aerosol according to one or more of claims 1-8.

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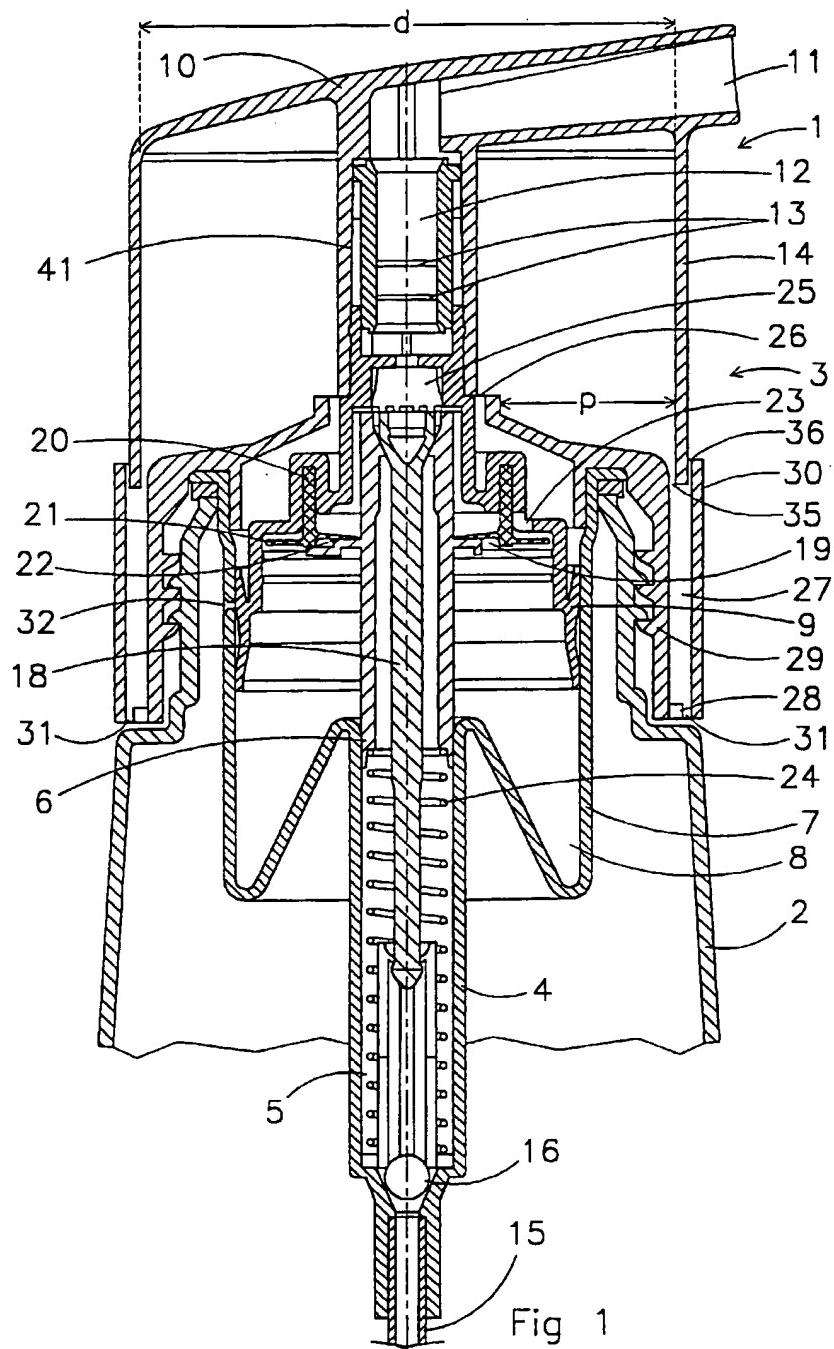
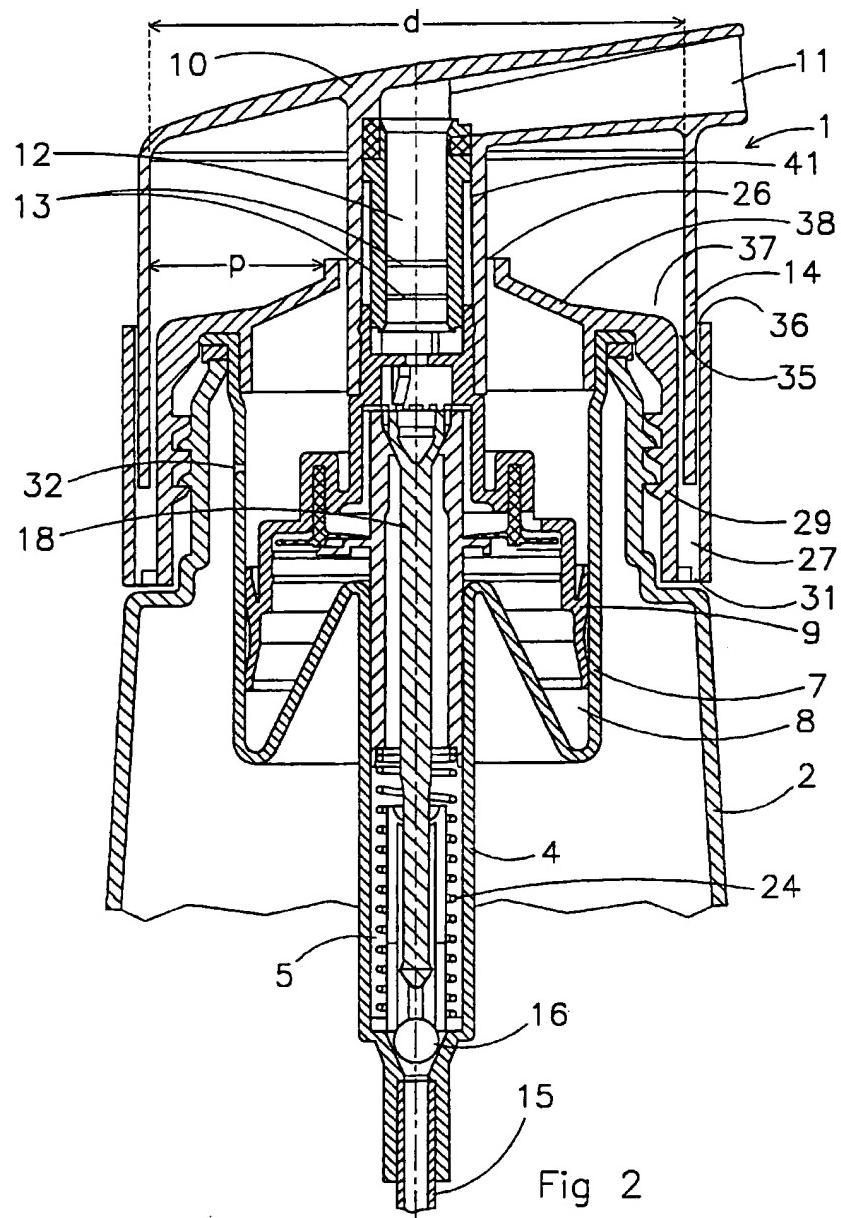
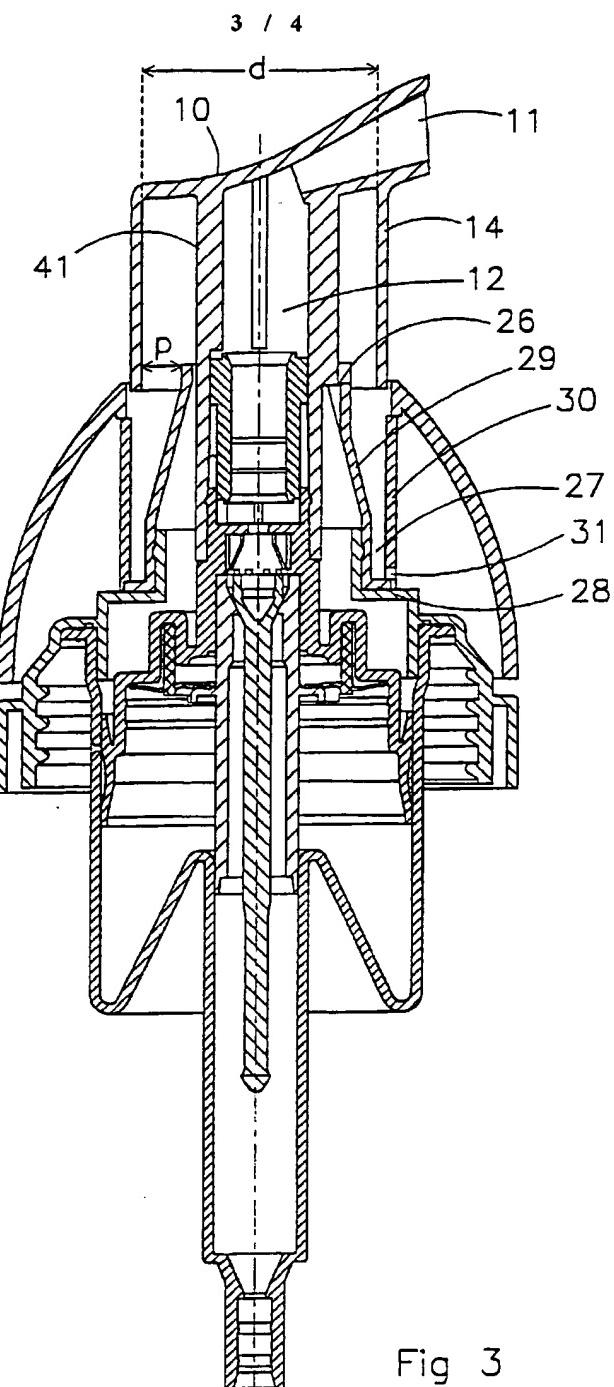


Fig. 1





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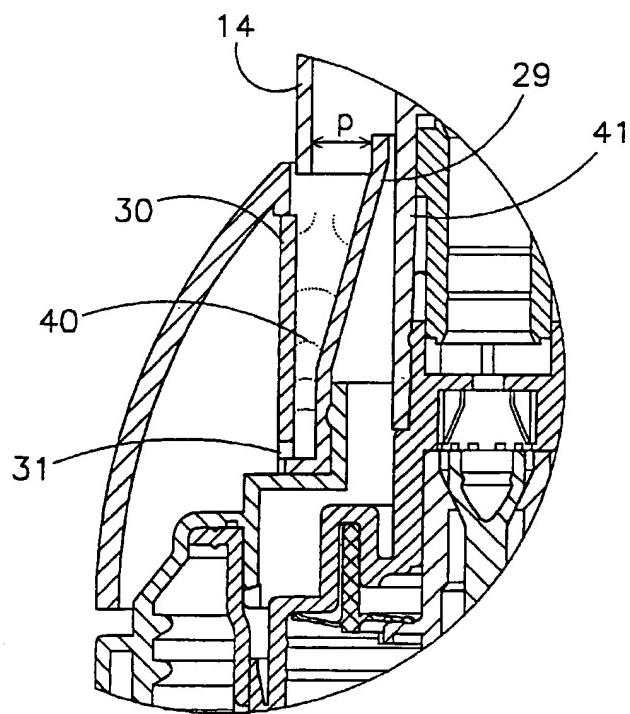


Fig 4

**INTERNATIONAL SEARCH REPORT**

Int'l	International Application No
PCT/NL 00/00441	

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>
IPC 7 B65D47/34 B05B11/00 B05B7/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 B05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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A		

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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6 October 2000

18/10/2000

Name and mailing address of the ISA European Patent Office, P.B. 5018 Patentstaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer
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Brévier, F

## INTERNATIONAL SEARCH REPORT

Int'l Application No  
PCT/NL 00/00441

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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A	FR 2 748 407 A (VALOIS) 14 November 1997 (1997-11-14) abstract; figure 7	1-9
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 08, 29 August 1997 (1997-08-29) & JP 09 099259 A (PURESUKE KK), 15 April 1997 (1997-04-15) abstract	1-9
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**INTERNATIONAL SEARCH REPORT**

Information on patent family members

Int'l Application No  
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1/3,AB,LS/1

DIALOG(R) File 351:Derwent WPI  
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014127791

WPI Acc No: 2001-612001/ 200171

XRAM Acc No: C01-183028

Foam-producing body cleansing composition contains a sulfosuccinic acid monoester salt surfactant together with an amphi- or betaine-surfactant  
Patent Assignee: HENKEL KGAA (HENK )

Inventor: SCHELGES H; SCHOLZ W

Number of Countries: 031 Number of Patents: 003

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
DE 10007321	A1	20010823	DE 1007321	A	20000217	200171 B
WO 200160332	A1	20010823	WO 2001EP1348	A	20010208	200171
AU 200131713	A	20010827	AU 200131713	A	20010208	200176

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Abstract (Basic): DE 10007321 A1

Abstract (Basic):

NOVELTY - A foam-producing body cleansing product comprises an aqueous cleanser in a non-aerosol dispenser with a foam valve (air foamer), the cleanser comprising (wt):

- (A) a sulfosuccinic acid monoester salt surfactant (5-20%);
- (B) an amphi- or betaine-surfactant (1-10%); and
- (C) water (60-90%).

USE - Cleansing of the skin and hair.

ADVANTAGE - The combination of (A) and (B) gives creamy, fine-celled foams which are non-irritating to the skin.

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